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mikromedia™

for dsPIC33EP®

Compact development system rich with on-board peripherals for all-round multimedia development on dsPIC33EP512MU810 device.

MikroElektronika
DEVELOPMENT TOOLS | COMPILERS | BOOKS

dsPIC

TO OUR VALUED CUSTOMERS

I want to express my thanks to you for being interested in our products and for having confidence in Mikroelektronika.

The primary aim of our company is to design and produce high quality electronic products and to constantly improve the performance thereof in order to better suit your needs.

Nebojsa Matic
General Manager

Table of Contents

Introduction to mikromedia for dsPIC33EP®

The **mikromedia for dsPIC33EP®** is a compact development system with lots of on-board peripherals which allow development of devices with multimedia contents. The central part of the system is a 16-bit **dsPIC33EP512MU810** microcontroller. The mikromedia for dsPIC33EP features integrated modules such as stereo MP3 codec, **TFT 320x240 touch screen** display, accelerometer, USB connector, audio connector, MMC/SD card slot, 8 Mbit flash memory, 2x26 connection pads and other. It comes pre-programmed with USB HID bootloader, but can also be programmed with external programmers, such as mikroProg™ or ICD2/3. Mikromedia is compact and slim, and perfectly fits in the palm of the hand, which makes it convenient platform for mobile devices.

Package Contains

01 Damage resistant protective box

02 mikromedia for dsPIC33EP® development system

03 DVD with documentation and examples

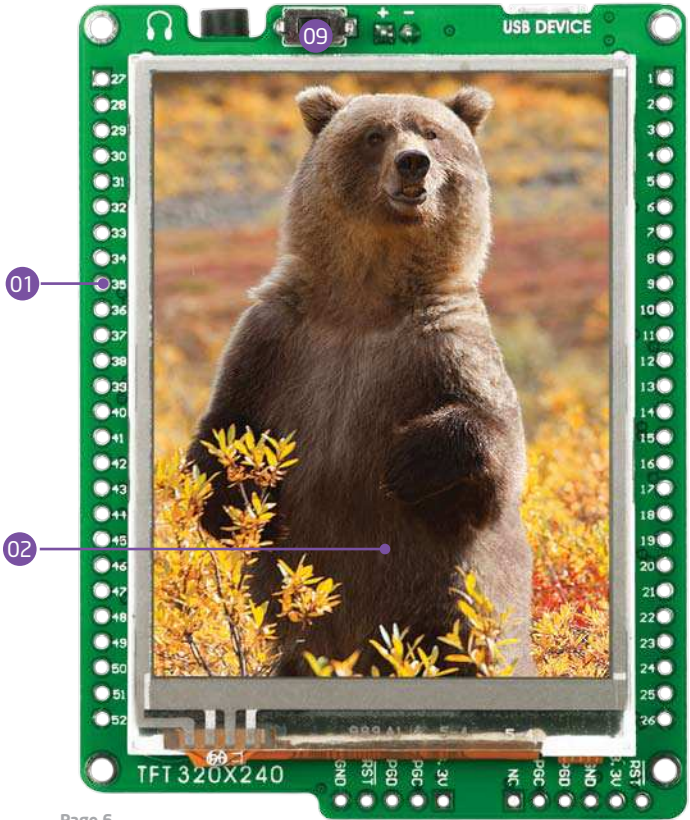
04 mikromedia for dsPIC33EP® user's guide

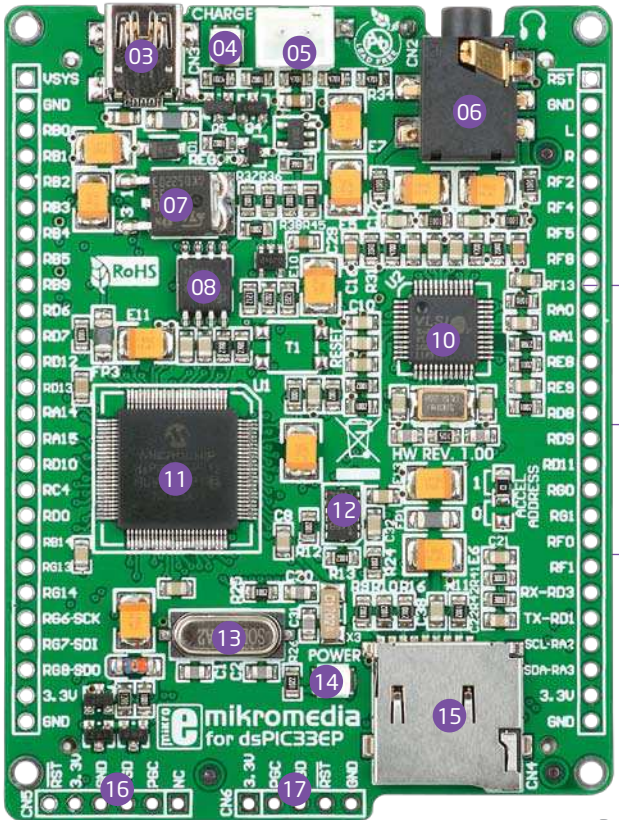
05 mikromedia for dsPIC33EP® schematic

06 USB cable

Key Features

01 Connection Pads
02 TFT 320x240 display
03 USB MINI-B connector
04 CHARGE indication LED
05 LI-Polymer battery connector
06 3.5mm headphone connector
07 Power supply regulator
08 Serial Flash memory
09 RESET button
10 VS1053 Stereo mp3 coder/decoder
11 dsPIC33EP512MU810 microcontroller
12 Accelerometer
13 Crystal oscillator
14 Power indication LED
15 microSD Card Slot
16 ICD2/3 connector
17 mikroProg connector





System Specification

power supply

Via USB cable (5V DC)

power consumption

75 mA with erased MCU

(when on-board modules are inactive)

board dimensions

81.2 x 60.5mm (3.19 x 2.38 inch)

weight

~50 g (0.11 lbs)

1. Power supply

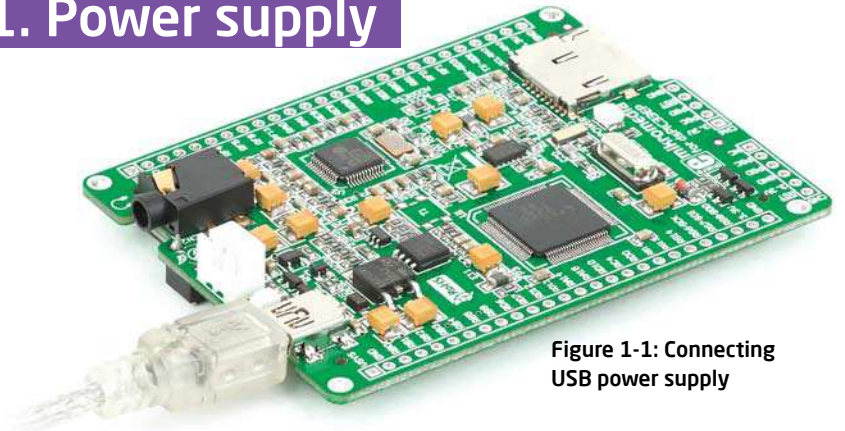


Figure 1-1: Connecting USB power supply

USB power supply

You can apply power supply to the board using **MINI-B USB** cable provided with the board. On-board voltage regulators provide the appropriate voltage levels to each component on the board. **Power LED (GREEN)** will indicate the presence of power supply.

Battery power supply

You can also power the board using **Li-Polymer** battery, via on-board battery connector. On-board battery charger circuit **MCP73832** enables you to charge the battery over USB connection. **LED diode (RED)** will indicate when battery is charging. Charging current is ~250mA and charging voltage is 4.2V DC.

Figure 1-2: Connecting Li-Polymer battery

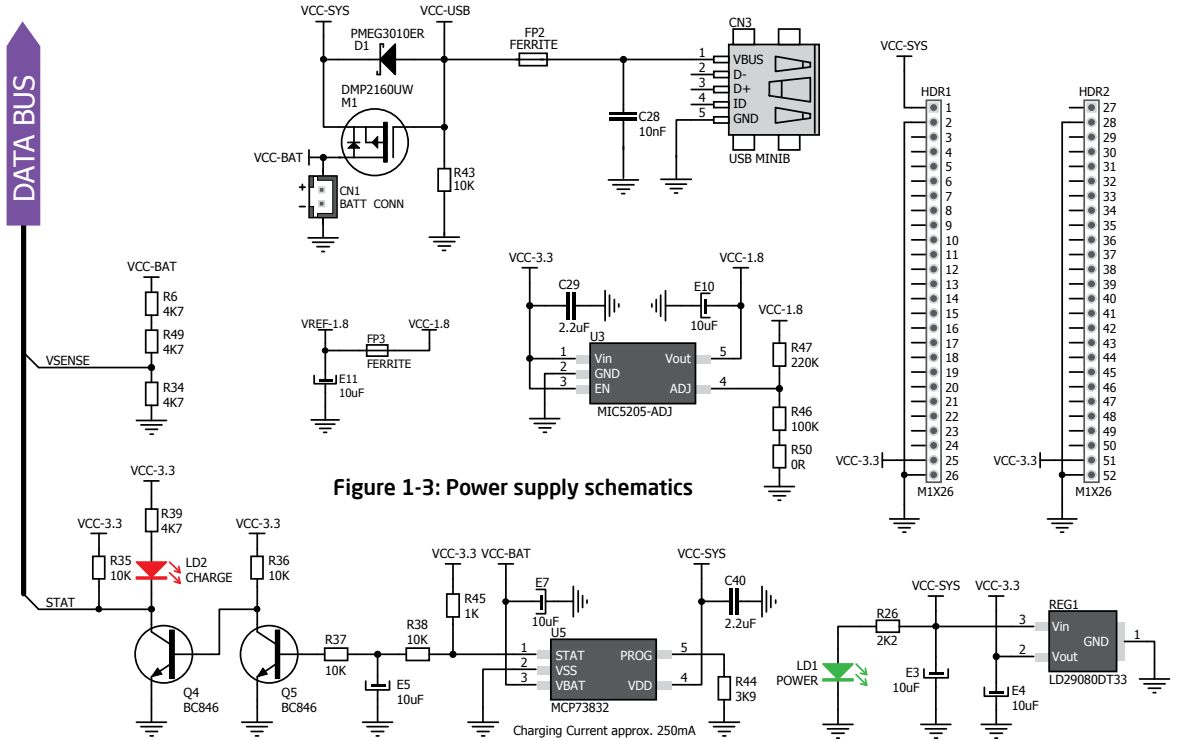
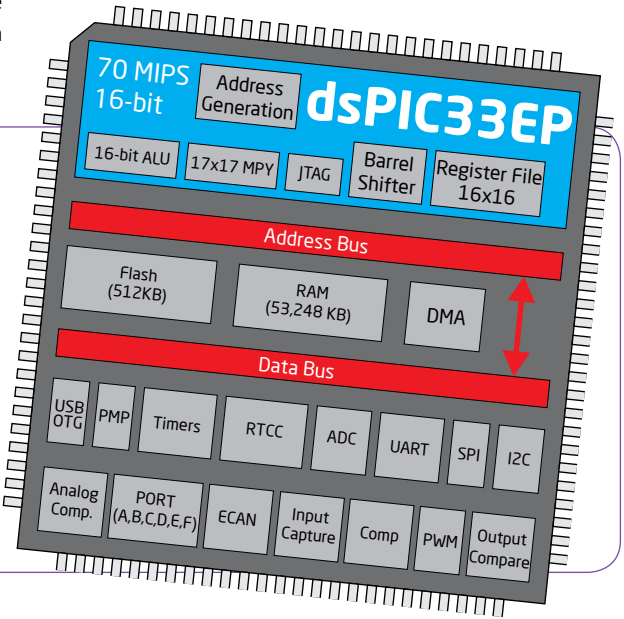


Figure 1-3: Power supply schematics

2. dsPIC33EP512MU810 microcontroller

The **mikromedia for dsPIC33EP®** development system comes with the **dsPIC33EP512MU810** microcontroller. This high-performance 16-bit microcontroller with its integrated modules and in combination with other on-board modules is ideal for multimedia applications.



Key microcontroller features

- Up to **70 MIPS** Operation;
- 16-bit architecture;
- 512KB of program memory, 24KB of auxiliary flash;
- 53.248 Bytes of RAM memory;
- 83 I/O pins;
- Internal Oscillator 7.37 MHz, 32kHz; RTCC
- nanoWatt features: Fast Wake/Fast Control;
- 4-UART, 4-SPI, 2-I2C, 2-CAN, USB 2.0 OTG;
- DAC, ADC, etc.

3. Programming the microcontroller

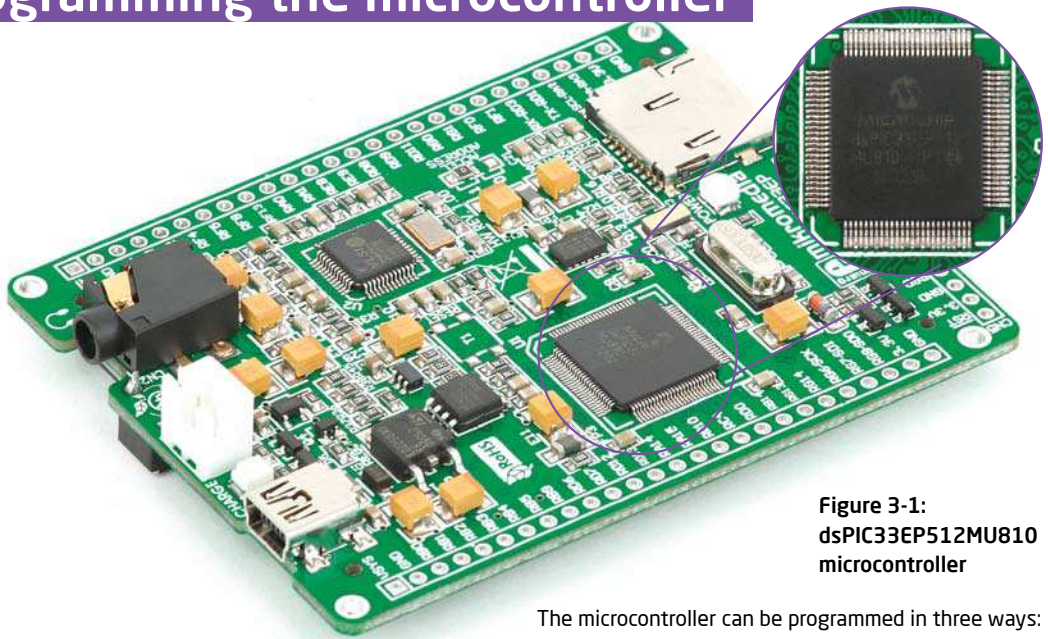


Figure 3-1: dsPIC33EP512MU810 microcontroller

The microcontroller can be programmed in three ways:

01 Over USB HID mikroBootloader

02 Using mikroProg™ external programmer

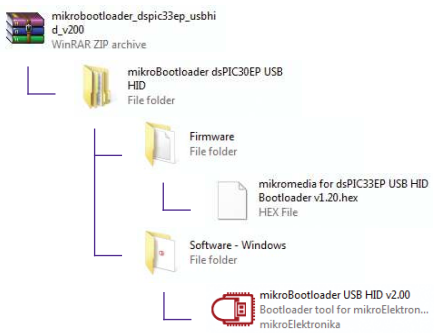
03 Using ICD2/3 external programmer

Programming with mikroBootloader

You can program the microcontroller with bootloader which is pre-programmed into the device by default. To transfer .hex file from a PC to MCU you need bootloader software (**mikroBootloader USB HID**) which can be downloaded from:

http://www.mikroe.com/eng/downloads/get/1859/mikrobootloader_dspic33ep_usbhid_v200.zip

After software is downloaded unzip it to desired location and start mikroBootloader USB HID software.



step 1 – Connecting mikromedia

Figure 3-2: USB HID mikroBootloader window

01 To start, connect the USB cable, or if already connected press the **Reset** button on your mikromedia board. Click the **"Connect"** button within 5s to enter the bootloader mode, otherwise existing microcontroller program will execute.

step 2 - Browsing for .HEX file

Figure 3-3: Browse for HEX

01 Click the **"Browse for HEX"** button and from a pop-up window (**Figure 3.4**) choose the .HEX file which will be uploaded to MCU memory.

step 3 - Selecting .HEX file

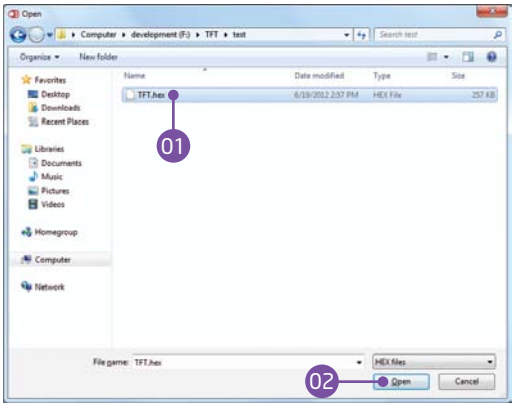


Figure 3-4: Selecting HEX

01 Select .HEX file using open dialog window.

02 Click the **"Open"** button.

step 4 - Uploading .HEX file

Figure 3-5: Begin uploading

01 To start .HEX file boot loading click the **"Begin uploading"** button.

Figure 3-6: Progress bar

01 You can monitor .HEX file uploading via progress bar

step 5 - Finish upload

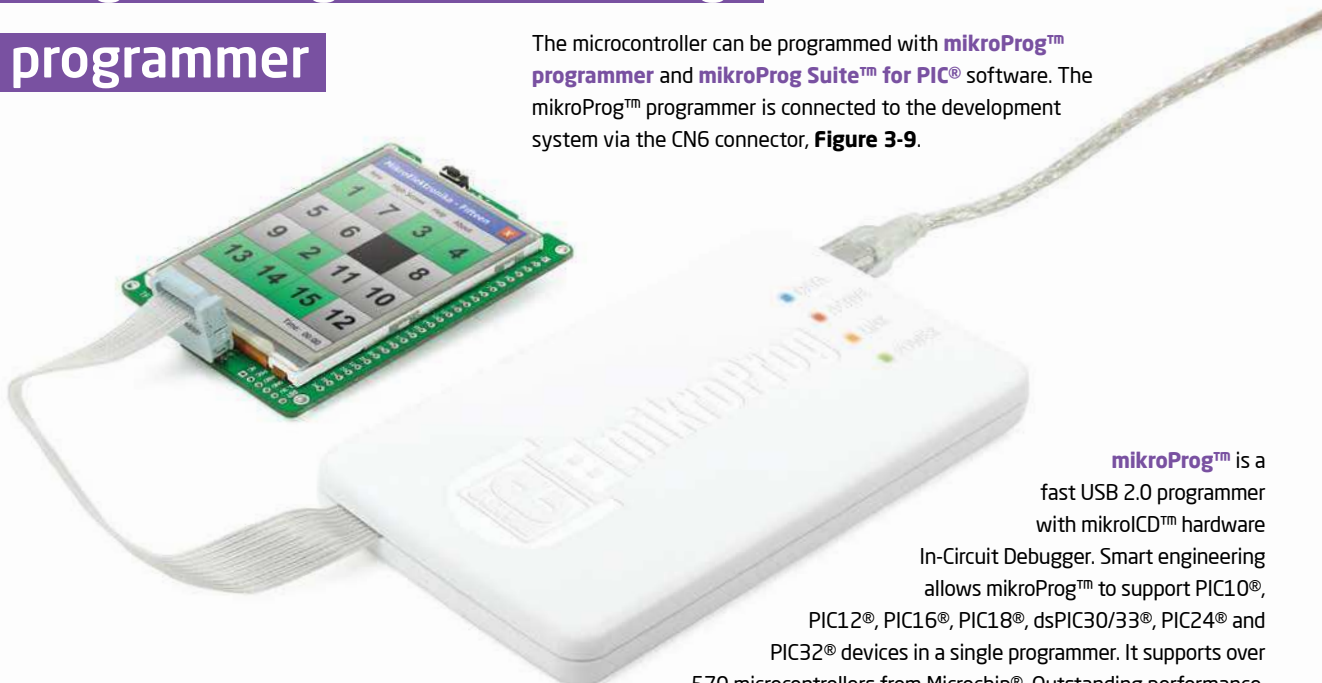
Figure 3-7: Restarting MCU

Figure 3-8: mikroBootloader ready for next job

01 Click the **"OK"** button after uploading is finished and wait for 5 seconds. Board will automatically reset and your new program will execute.

Programming with mikroProg™ programmer

The microcontroller can be programmed with **mikroProg™ programmer** and **mikroProg Suite™ for PIC®** software. The mikroProg™ programmer is connected to the development system via the CN6 connector, **Figure 3-9**.



mikroProg™ is a fast USB 2.0 programmer with mikroICD™ hardware In-Circuit Debugger. Smart engineering allows mikroProg™ to support PIC10®, PIC12®, PIC16®, PIC18®, dsPIC30/33®, PIC24® and PIC32® devices in a single programmer. It supports over 570 microcontrollers from Microchip®. Outstanding performance, easy operation and elegant design are it's key features.

Figure 3-9:
Connecting mikroProg™ to mikromedia™

mikroProg Suite™ for PIC® Software

mikroProg™ programmer requires special programming software called **mikroProg Suite™ for PIC®**. This software is used for programming of ALL Microchip® microcontroller families, including PIC10®, PIC12®, PIC16®, PIC18®, dsPIC30/33®, PIC24® and PIC32®. Software has intuitive interface and SingleClick™ programming technology. Just by downloading the latest version of **mikroProg Suite™** your programmer is ready to program new devices. **mikroProg Suite™** is updated regularly, at least four times a year, so your programmer will be more and more powerful with each new release.

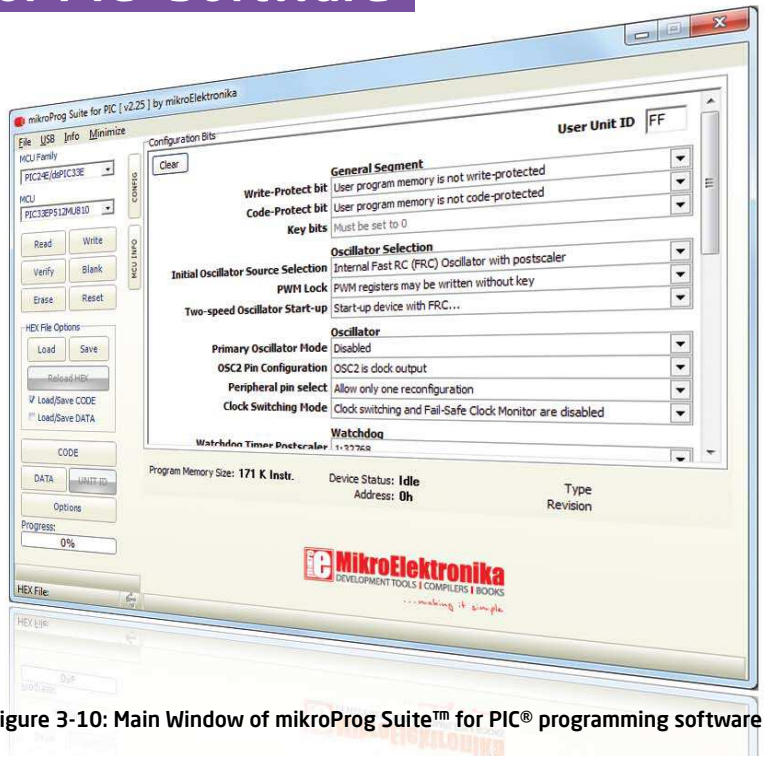


Figure 3-10: Main Window of mikroProg Suite™ for PIC® programming software

Programming with ICD2® or ICD3® programmer

The microcontroller can be also programmed with **ICD2® or ICD3® programmer**. These programmers connects with mikromedia board via **ICD2 CONNECTOR BOARD.**

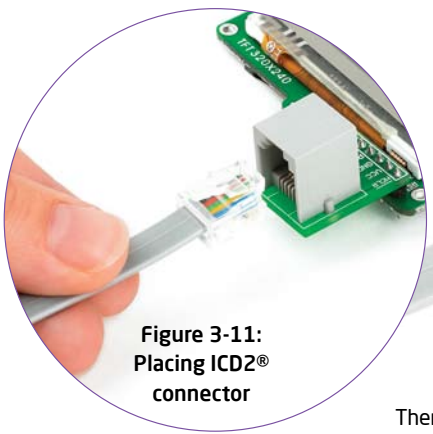


Figure 3-11: Placing ICD2® connector

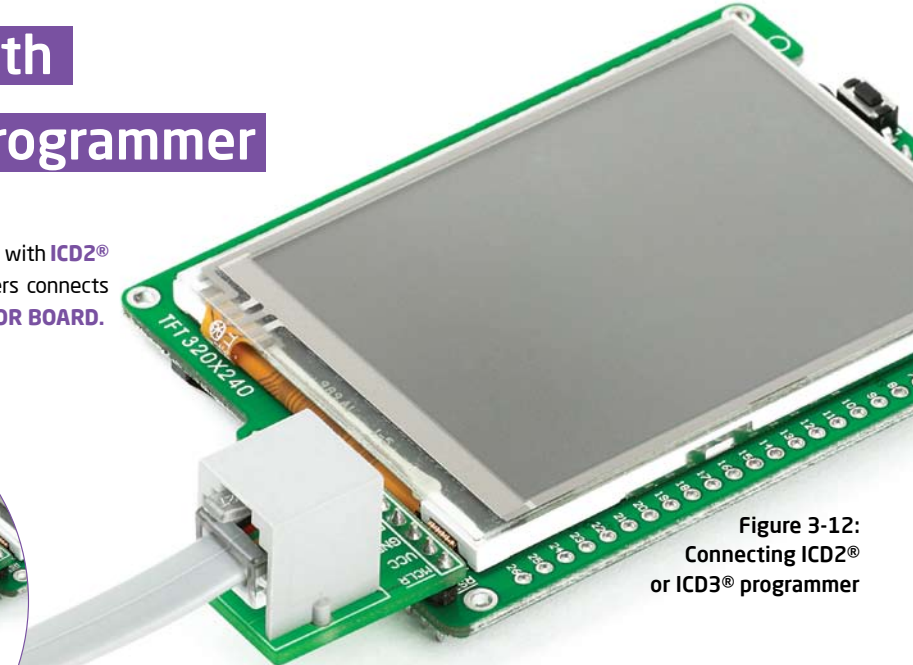


Figure 3-12: Connecting ICD2® or ICD3® programmer

In order to enable the ICD2® and ICD3® programmers to be connected to the mikromedia board, it is necessary to provide the appropriate connector such as the **ICD2 CONNECTOR BOARD**. This connector should be first soldered on the CN5 connector. Then you should plug the ICD2® or ICD3® programmer into it, **Figure 3-11**.

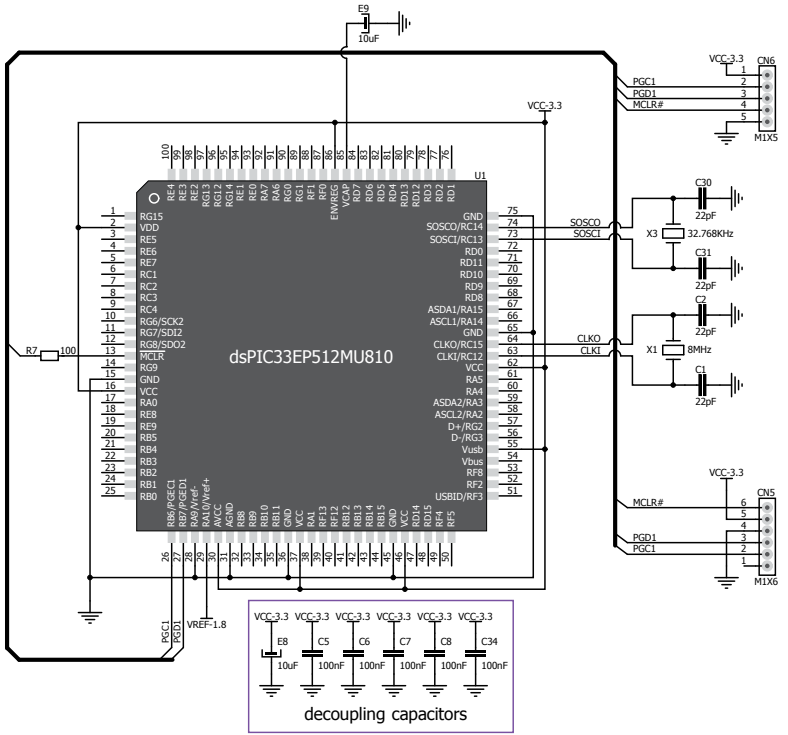
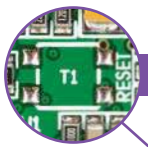


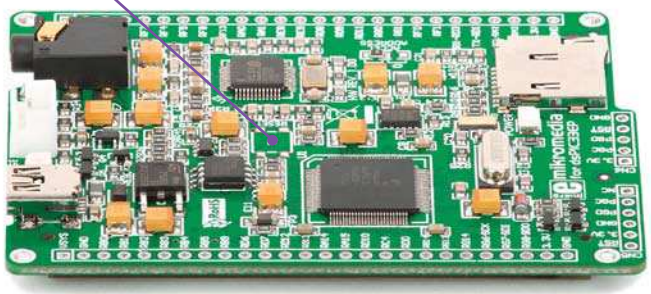
Figure 3-13: mikroProg™ & ICD2 / ICD3 programmer connection schematic

4. Reset Button

Board is equipped with reset button, which is located at the top of the front side (**Figure 4-2**). If you want to reset the circuit, press the reset button. It will generate low voltage level on microcontroller reset pin (input). In addition, a reset can be externally provided through **pin 27** on side headers (**Figure 4-3**).



NOTE *You can also solder additional reset button on the appropriate place at the back side of the board,* **Figure 4-1**.



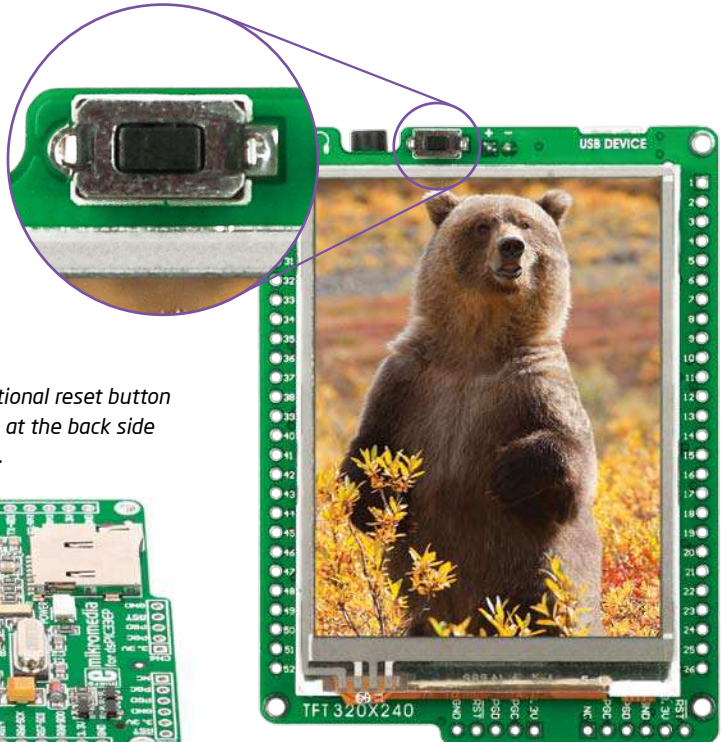


Figure 4-2: Frontal reset button

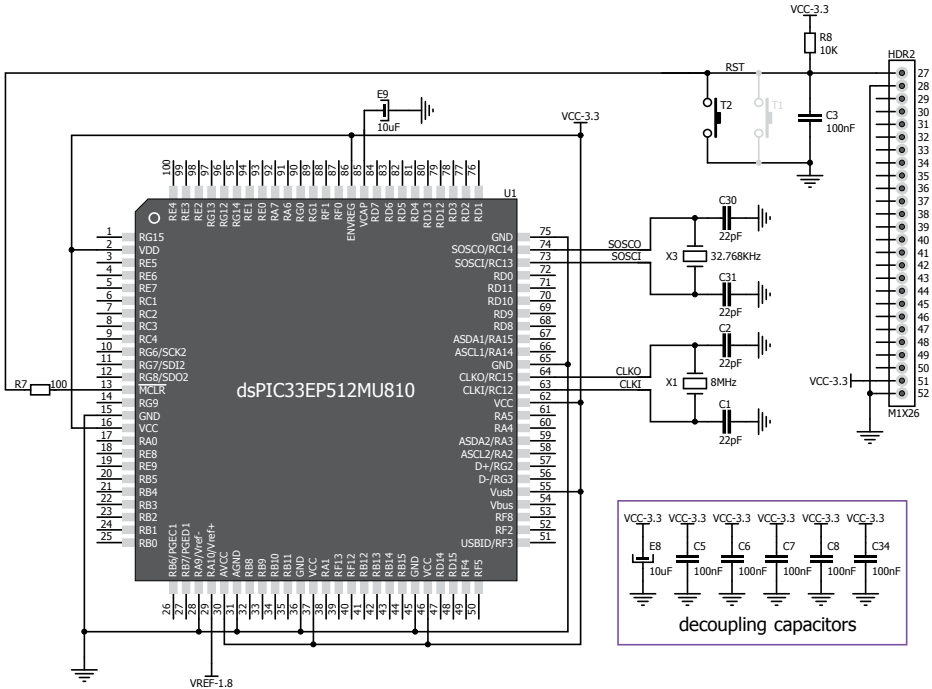
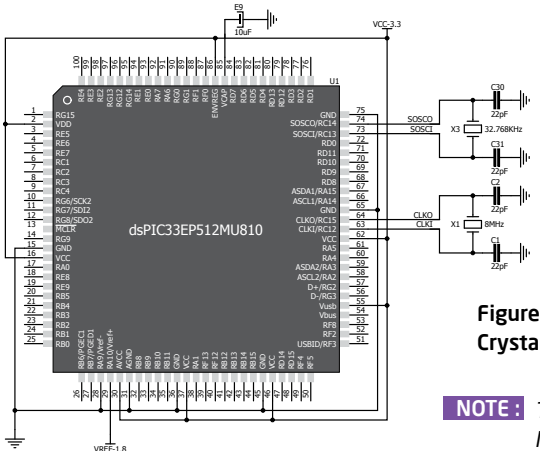


Figure 4-3: Reset circuit schematic

5. Crystal oscillator

Board is equipped with **8MHz crystal oscillator (X1)** circuit that provides external clock waveform to the microcontroller CLKO and CLKI pins. This base frequency is suitable for further clock multipliers and ideal for generation of necessary USB clock, which ensures proper operation of bootloader and your custom USB-based applications. Board also contains **32.768kHz Crystal oscillator (X3)** which provides external clock for internal **RTCC** module.



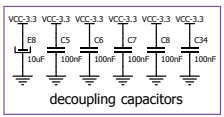


Figure 5-1:
External crystal oscillator (X1)

Figure 5-2:
Crystal oscillator schematic

NOTE : *The use of crystal in all other schematics is implied even if it is purposely left out because of the schematics clarity.*

6. MicroSD Card Slot

Board contains **microSD card slot** for using microSD cards in your projects. It enables you to store large amounts of data externally, thus saving microcontroller memory. MicroSD cards use Serial Peripheral Interface (**SPI**) for communication with the microcontroller.

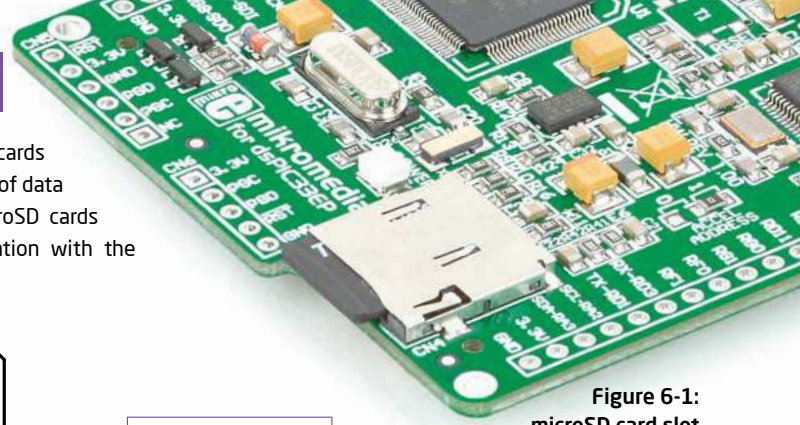


Figure 6-1:
microSD card slot

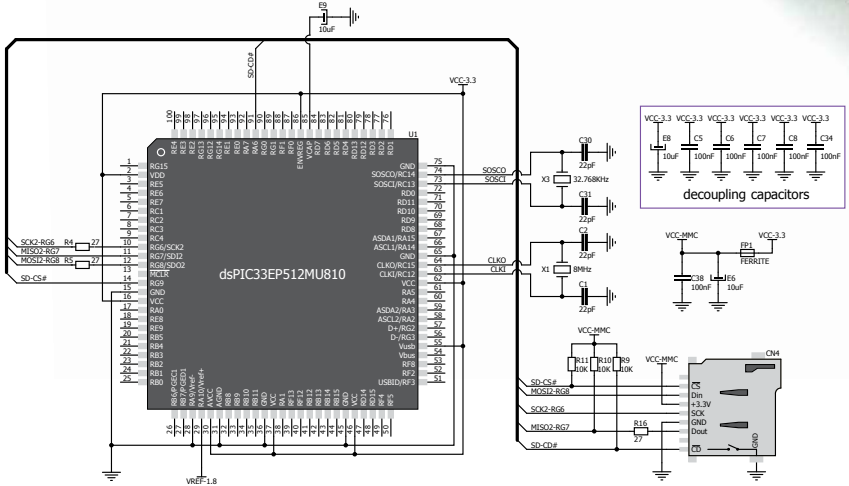


Figure 6-2:
microSD Card Slot module connection schematic

Figure 6-3:
Inserting microSD card

7. Touch Screen

The development system features a **TFT 320x240 display** covered with a **resistive** touch panel. Together they form a functional unit called a **touch screen.** It enables data to be entered and displayed at the same time. The TFT display is capable of showing graphics in **262.144** different **colors**.

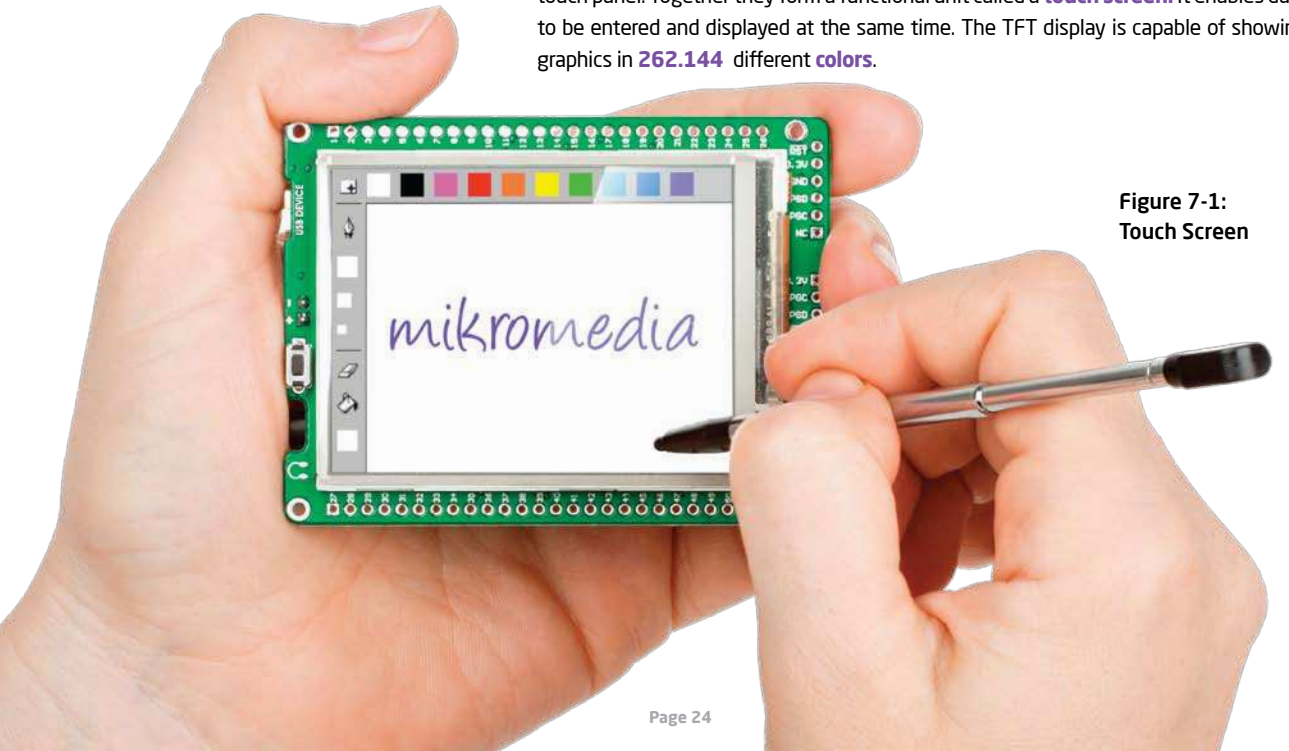


Figure 7-1:
Touch Screen

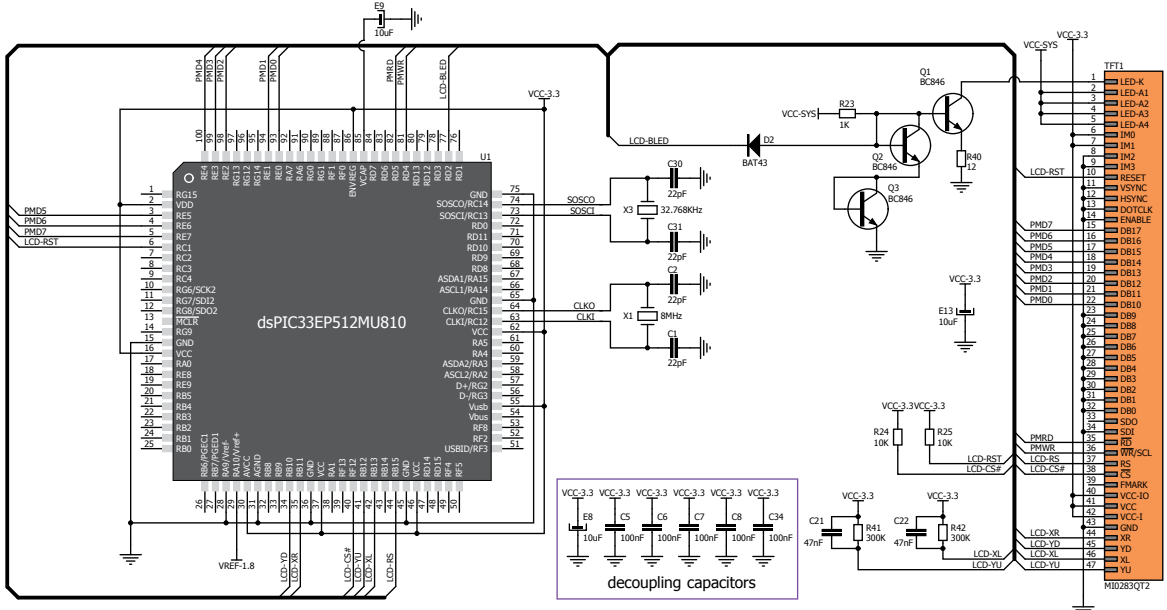


Figure 7-2: Touch Screen connection schematic